

Amendment
Application No. 10/623,679
Attorney Docket No. 030891

REMARKS

Claims 1-3 and 5-30 are pending in this application. No amendment has been made in this Response.

(1) Applicants herewith file an Information Disclosure Statement.

(2) Claims 1-3 and 5-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ishibashi (U.S. Patent No. 6,579,657), in view of Kanda et al. (JP 2001-019860)

(I) The Examiner states that Kanda et al. disclose a resin composition having non-ionic surfactants, and teach that suitable non-ionic surfactants include ethoxylated alcohols such as those instantly claimed in combinations with water as a solvent, therefore it would have been obvious to one of ordinary skill in the art to prepare the material of Ishibashi et al. choosing to employ the surfactant of Kanda et al. as the non-ionic surfactant with reasonable expectation of achieving a material for forming a fine pattern. Page 4 of the outstanding Office Action. Emphasis added.

However, the instant claims do not recite any “ethoxylated alcohols” taught by Kanda et al. In the previous amendment filed on November 13, 2006, claims 1, 21, 23, 26 and 27 had been amended to delete the “alcohol surfactant” and “secondary alcohol ethoxylate surfactant.”

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The surfactants taught by Kanda et al. are an acetylene alcohol, an acetylene glycol, a polyethoxylate of an acetylene alcohol, and a polyethoxylate of an acetylene glycol. Kanda et al. do not teach or suggest the surfactants as recited in the instant claims. Please see the abstract and paragraphs [0009]-[0010] of Kanda et al.

Ishibashi et al. also do not disclose the claimed surfactant. Thus, even a combination of the cited references does not make the invention of the claims.

(II) In response to the previous Applicants' argument that none of the cited references teaches thickening a resist pattern formed by using an ArF resist, the Examiner states that in column 6, lines 45-51, Ishibashi et al. clearly contemplate the use of an ArF excimer laser, and therefore, the material of Ishibashi et al. is capable of being an ArF resist and the rejection of record is maintained.

(i) In this respect, the Applicants request the Examiner to review the three articles filed therewith as an IDS and to determine the technical level at the time when the invention of Ishibashi et al. was filed. The Ishibashi reference was filed in Japan on March 31, 1997, and filed in the U.S. on March 27, 1998.

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(a) The first article, Advanced Micro-Lithography Process with Chemical Shrink Technology, discloses that “(t)hough the acetal type KrF positive resist (low activation energy system) can achieve around 0.1 μ m CH after RELACS processing under the optimized condition, the acrylate type positive resist (high activation energy system) showed less shrinkage under the same process condition. The shrinkage performance of the RELACS process largely depends on the resist chemistry used as the underlying layer” (Abstract. Emphasis added.). Fig. 8 of the first article clearly shows that the shrinkages between the acetal resists and acrylate resists are different. Please note that the “RELACS material” generally corresponds to the material disclosed by Ishibashi et al. (U.S. Patent No. 6,579,657).

Therefore, the first article clearly suggests that it is known that depending on the types of resins, the degree of the thickening varies. One skilled in the art does not recognize a suitable combination of a resist pattern and a resist pattern thickening material without actual experiments.

The first article was published on January 15, 2001, which is long after Ishibashi’s foreign priority date (March 31, 1997) or the US filing date (March 27, 1998).

The authors of the first article overlap with the inventors of Ishibashi et al. (U.S. Patent No. 6,579,657) and Kanda et al. (JP 2001-019860). That is, the authors of the first article

include Takeo Ishibashi and Toshiyuki Toyoshima, overlapping with the inventors of Ishibashi et al., and Takashi Kanda and Hatsuyuki Tanaka, overlapping with the inventors of Kanda et al.

(b) The second article, “Below 70nm Contact Hole Pattern with RELACS Process on ArF Resist,” discloses as follows:

A chemical shrink technology, RELACS™ (Resolution Enhancement Lithography Assisted by Chemical Shrink) utilizes the cross linking reaction catalyzed by the acid component existing in a predefined resist pattern. This “RELAX™” process is a hole shrinking procedure that includes simple coating, baking, and rinsing applied after conventional photolithography. Our target is realize of sub-70nm hole pattern formation by using new RELACS™ for ArF resist. At present, RELACS™ process is introduced to mass production of KrF lithography by using AZ®R200 (Product name of Clariant) mainly. Then first of all we reported process performance of conventional RELACS™ material, AZ®R200, with ArF resist. However, AZ®R200 does not show satisfactory shrinkage on ArF resist. Thereupon, we started on the development of new RELACS™ corresponding to ArF resist. As the result, we developed new RELACS™ material including Cross Linking Accelerator (CLA). It was found that CLA is able to improve reactivity of RELACS™ with ArF-resist. By using this new RELACS™, It is Realized sub-70nm hole pattern formation with ArF-Ex lithography and It is able to Control of hole size by mixing bake (MB) temperature and additive ratio of CLA. Moreover this process was realized that thickness of shrunk hole is increased.

(Abstract. Emphasis added.)

The second article was published on June 12, 2003, which was long after the Ishibashi’s foreign priority date (March 31, 1997) or the US filing date (March 27, 1998).

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The authors of the second article overlap with the inventors of Ishibashi et al. (U.S. Patent No. 6,579,657) and Kanda et al. (JP 2001-019860). That is, the authors of the second article include Takeo Ishibashi and Toshiyuki Toyoshima, overlapping with the inventors of Ishibashi et al., and Hatsuyuki Tanaka, overlapping with the inventor of Kanda et al.

The authors admit in June 2003 that RELACSTM process is introduced to mass production in KrF lithography, but the conventional RELACSTM material does not show satisfactory shrinkage on ArF resist. In particular, the author states that their target in June 2003 was to realize sub-70nm hole pattern formation by using new RELACSTM for ArF resist, and they had realized sub-70nm hole pattern formation with ArF-Ex lithography in the second article. The authors admitted that as of June 2003, there had not existed any RELACSTM materials showing satisfactory shrinkage on ArF resist.

(c) The third article, “Newly Developed Resolution Enhancement Lithography Assisted by Chemical Shrink Process and Materials for Next-Generation Devices,” discloses that “(b)ecause the chemical reaction utilized for a RELACS material for KrF lithography (AZ P200, 500 series) is not useful for ArF-resist chemistry, we have developed a novel chemical reaction system that focuses on the difference in the chemical structure of the reactive sites of a resist polymer (p.5354, right col., lines 12-17. Emphasis added.).”

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The third article was published on June 20, 2006, which is long after the Ishibashi's foreign priority date (March 31, 1997) or the US filing date (March 27, 1998).

The authors of the third article overlap with the inventor of Ishibashi et al. (U.S. Patent No. 6,579,657).

The authors of the third article, including Mr. Takeo Ishibashi, states that a RELACS material specialized in thickening a KrF resist was not suitable for an ArF resist, and developed a new material to be applicable to an ArF resist.

(ii) It is understood from the first article that depending on the types of resins, the degree of thickening varies, so that one skilled in the art does not recognize a suitable combination of a resist pattern and a resist pattern thickening material without actual experiments.

As clearly understood from the second article, there had not existed conventional RELACSTM materials showing satisfactory shrinkage on ArF resist as of June 2003. From the third article, it is understood that the RELACS material specialized in thickening a KrF resist, as disclosed in Ishibashi et al., was not suitable for an ArF resist.

Thus, even if the Ishibashi reference disclose that an ArF excimer laser may be used as a light source (col. 6, lines 45-47), Ishibashi et al. later admitted that as of June 2003 there had not

existed any RELACSTM materials showing satisfactory shrinkage on ArF resist. Thus, the disclosure that an ArF excimer laser may be used as a light source in the Ishibashi reference (col. 6, lines 45-47) is speculation by Ishibashi et al. and which is not an enabling description.

(iii) It is well settled that prior art under 35U.S.C. §102(b) must sufficiently describe the claimed invention to have placed the public in possession of it. In re Sasse, 629 F.2d 675, 681, 207 USPQ 107, 111 (CCCP 1980). Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. Accordingly, even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling. In re Donohoe 766 F.2d 531, 226 USPQ 619 (Fed. Cir 1985).

Also, mere naming of the ArF excimer as a light source (col. 6, lines 46 of Ishibashi et al.) cannot constitute an enabling description of the light source. In re Wiggins, 488 F.2d 538, 179 USPQ 421 (CCCP 1973). In the Wiggins' case, *Guidicelli's listing of the compounds by name constituted nothing more than speculation about their potential or theoretical existence. The mere naming of a compound in a reference, without more, cannot constitute a description of the compound, particularly when, as in this case, the evidence of record suggests that a method suitable for its preparation was not developed until a date later than that of the reference. If we were to hold otherwise, listing of thousands of theoretically possible compounds could be*

generated and published which, assuming it would be within the level of skill in the art to make them, would bar a patent to the actual discoverer of a named compound no matter how beneficial to mankind it might be. In view of the fact that the purpose sought to be effectuated by the patent law is the encouragement of innovation such a result would be repugnant to the statute. Therefore, we hold that the compounds named in Guidicelli and within the scope of the claimed in issue were not "described in a printed publication" as meant by the applicable portion of § 102(b). In re Wiggins, 488 F.2d 538, 179 USPQ 421 (CCCP 1973).

(iv) Thus, to employ an ArF excimer, or to employ an ArF resistis not enabling in Ishibashi et al., which is speculation by Ishibashi et al. As later admitted in the second article, there had not existed a conventional RELACSTM material or a resist pattern thickening material showing satisfactory shrinkage on an ArF resist, as of June 2003. Therefore, the materials disclosed in Ishibashi et al. in 1997 must not have been applicable to an ArF resist. There is no actual data for the ArF laser in Ishibashi et al. The invention of the composition for thickening a resist pattern formed of an ArF resist was not completed at the time when Ishibashi et al. was filed, and to employ ArF excimer in col. 6. line 46 is not enabling in Ishibashi et al. Thus, the "ArF excimer" named in Ishibashi et al. should be considered not described in the Ishibashi reference. In re Wiggins, 488 F.2d 538, 179 USPQ 421 (CCCP 1973).

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(v) On the other hand, the material of the present invention, as specifically recited in the claims, can efficiently thicken the resist pattern formed of ArF resist, as shown in the description and Tables 1-3 at pages 37-41 of the specification. The inventors of the present invention are *the actual discoverers of the invention that is capable of thickening a resist pattern of ArF resist, who should not be bared by the mere speculation by Ishibashi et al. In re Wiggins, 488 F.2d 538, 179 USPQ 421 (CCCP 1973).*

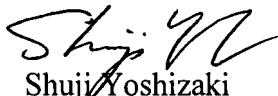
(3) Therefore, the invention as recited in claims 1-3 and 5-30 are not obvious over the cited references. Reconsideration of the rejection is respectfully requested. Applicants submit that that the claims are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
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Petition for Extension of Time